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solutions by pumping the heated ingredient streams simultaneously through a coaxial fluid mixer producing coprecipitated powder, then the coprecipitated powder is collected in a drown-out vessel and refluxed at a temperature of 90°-95° C for 12 hours, then filtered, deionized-water washed, dried, and then calcined at 1050° C in air; [[that had a relative permittivity of 33,500]]; and

- b) onto the wet-chemical-prepared calcined composition-modified barium titanate powder, [[a first uniform coating of 100 Å of aluminum oxide]] an aluminum oxide ( $\text{Al}_2\text{O}_3$ ) coating of 100 Å thickness was fabricated with the use of aluminum nitrate nonahydrate [ $\text{Al}(\text{NO}_3)_3 \cdot 9\text{H}_2\text{O}$ ] precursor applied by wet chemical means, then calcined at 1050° C, resulting in a single-coated calcined composition-modified barium titanate powder; and
- c) onto the alumina-coated composition-modified barium titanate powder, a second uniform coating of 100 Å of calcium magnesium aluminosilicate glass derived and fabricated from alcohol-soluble precursors: calcium methoxide [ $(\text{CH}_3\text{O})_2\text{Ca}$ ] or calcium isopropoxide  $\{[(\text{CH}_3)_2\text{CHO}]_2\text{Ca}\}$ , magnesium methoxide [ $(\text{CH}_3\text{O})_2\text{Mg}$ ] or magnesium ethoxide [ $(\text{CH}_3\text{CH}_2\text{O})_2\text{Mg}$ ], aluminum ethoxide [ $(\text{CH}_3\text{CH}_2\text{O})_3\text{Al}$ ] or aluminum isopropoxide  $\{[(\text{CH}_3)_2\text{CHO}]_3\text{Al}\}$  or aluminum isopropoxide  $\{[(\text{CH}_3)_2\text{CHO}]_3\text{Al}\}$ , and tetraethyl orthosilicate [ $\text{Si}(\text{OCH}_2\text{CH}_3)_4$ ] are applied by wet chemical means which upon calcining at 500° C results [[resulting]] in a double-coated composition-modified barium titanate powder [[that had a relative permittivity of 29,480]]; and

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- d) blending, this double-coated composition-modified barium titanate powder with [[an organic resin binder]] a screen-printing ink containing appropriate plastic resins, surfactants, lubricants, and solvents to provide a suitable rheology for screen printing; and
- e) screen-printed into interleaved multilayers of alternating offset nickel electrode layers 12 and double-coated calcined composition-modified barium titanate high-relative-permittivity layers 11 with the use of screening inks having the proper rheology for each of the layers; and
- f) dry and cut the screen-printed multilayer components 15 into a specified rectangular area; and
- g) binder-burnout and sinter the screen-printed multilayer components 15, first at a temperature of 350° C for a specified length of time, then at 850° C for a specified length of time, to closed-pore porous ceramic bodies; and
- h) hot isostatically press the closed-pore porous ceramic bodies, at a temperature of 700° C with a specified pressure, into a void-free condition; and
- i) grind and polish each side of the component to expose the alternating offset interleaved nickel electrodes 12; and
- j) nickel side bars 14 are connected to each side of the components 15, that have the interleaved and alternating offset nickel electrodes 12 exposed, by applying nickel ink with the proper rheology to each side and clamping the combinations together; and

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- k) components and side nickel bar combination 14-15 are then heated at the proper temperature, 800° C, and time duration of 20 minutes to bond them together, and
  - l) wave solder each side of the conducting bars; and
  - m) components 15 with the connected nickel side bars 14 are then assembled into the first array, utilizing unique tooling and solder-bump technology; and
  - n) the first arrays are then assembled into the second array; and
  - o) the second arrays are then assembled into the EESU final assembly.
2. (Currently amended) [[An electrical-energy-storage unit as recited in claim 1 that did not degrade due to being fully charged or discharged because of the]] The method steps as recited in claim 1 that provide a second coating of glass onto the double-coated composition-modified barium titanate powder being [[nonreactive]] in contact with the nickel electrodes [[in contact with the glass at applied voltages up to the]] and having an applied working voltage of 3500 V [[, from the lower to the upper temperature limits of a commercial product]] across the parallel electrodes.
3. (Cancelled)
4. (Currently amended) [[An electrical-energy-storage unit as recited in Claim 1]] The method steps as recited in claim 1 that provide [[that due to the]] a unique double coating of the composition-modified barium titanate powder and the hot isostatic pressing at the near-minimum-temperature viscous-flow condition of the glass, [[800° C]] 700° C, a dielectric voltage breakdown strength of [[6.35]] 5.0 x 10<sup>6</sup> V/cm was achieved across the [[terminals]] electrodes of the components.

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5. (Previously presented) [[An electrical-energy-storage unit as recited in Claim 1 that had]] The method steps as recited in claim 1 that provide an ease of manufacturing due to the softening temperature of the calcium magnesium aluminosilicate glass allowing the relatively low [[sintering and]] hot-isostatic-pressing temperatures of 700° C which in turn provided a void-free ceramic body.
6. (Previously presented) [[An electrical-energy-storage unit as recited in Claim 1 that had]] The method steps as recited in claim 1 that provide an ease of fabrication due to the softening temperature of the calcium magnesium aluminosilicate glass allowing the relatively low [[sintering and]] hot-isostatic-pressing temperatures of [[800° C]] 700° C which in turn [[allow]] allows the use of nickel for the conduction-path electrodes rather than expensive platinum, palladium, or palladium-silver alloy.
7. (Currently amended) [[An electrical-energy-storage unit as recited in Claim 1 that had]] The method steps as recited in claim 1 that provide an ease of fabrication due to the softening temperature of the calcium magnesium aluminosilicate glass allowing the relatively low [[sintering and]] hot-isostatic-pressing temperatures of [[800° C]] 700° C, which feature along with the coating method provided a uniform-thickness shell of the calcium magnesium aluminosilicate glass and in turn provides hot-isostatic-pressed double-coated composition-modified barium titanate high-relative-permittivity layers that were uniform and homogeneous in microstructure.
8. (Currently amended) [[An electrical-energy-storage unit as recited in Claim 1 that due to]] The method steps as recited in claim 1 that provide the double coating of the basis particles of the composition-modified barium titanate powder reduced the leakage and aging of this material by an order of magnitude of the specification of this basis material, thus reducing the discharge rate to 0.1% per 30 days [[, with the result that

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increasing the thickness of the coating layers provides the flexibility in the design to reduce the leakage and discharge rate further if required]].

9. (Cancelled)

10. (Currently amended) [[An electrical-energy-storage unit as recited in Claim 1 that due to]] The method steps as recited in claim 1 that provide a double coating of the composition-modified barium titanate powder, the hot-isostatic-pressing process, the high-density solder-bump packaging, and along with the double-layered array configuration stored 52,220 Wh of electrical energy in a 2005 inches<sup>3</sup> container [[and this energy storage capability was retained over the lower to the upper temperature limits of a commercial product]].

11. (Currently amended) [[An electrical-energy-storage unit as recited in Claim 1 indicates that the]] The method steps as recited in claim 1 that provide materials used: [[constituents oxides]] water-soluble precursors of barium (Ba), calcium (Ca), titanium (Ti), zirconium (Zr), manganese (Mn), yttrium (Y), neodymium (Nd), forming the composition-modified barium titanate powder, and the metals: nickel (Ni), and copper (Cu), which are not explosive, corrosive, or hazardous.

12. (Currently amended) [[An electrical-energy-storage unit as recited in Claim 1 that can supply electrical energy to]] The method steps as recited in claim 1 that provide an EESU that is not explosive, corrosive, or hazardous and therefore is a safe product when used in electrical vehicles, which include bicycles, tractors, buses, cars, or any device used for transportation or to perform work [[and is not explosive, corrosive, or hazardous]].

13. (Currently amended) [[An electrical-energy-storage unit as recited in Claim 1]] The method steps as recited in claim 1 that provide an EESU [[that]] which can store

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electrical energy ~~[[from electrical-energy-delivery systems and then be used to supply electrical energy to]]~~ generated from solar voltaic cells or other alternative sources for residential, commercial, or industrial applications.

14. (Currently amended) ~~[[An electrical-energy-storage unit as recited in Claim 1]]~~ The method steps as recited in claim 1 that provide and EESU ~~[[that]]~~ which can store electrical energy from ~~[[electrical-energy-delivery systems and then be transported to a required location and be used as a source of electrical energy and is not explosive, corrosive, or hazardous]]~~ the present utility grid during the night when the demand for electrical power is low and then deliver the electrical energy during the peak power demand times and thus provide an effective power averaging function.

15. (Canceled)

16. (Canceled)

17. (Currently amended) ~~[[An electrical-energy-storage unit as recited in Claim 1 that due to the]]~~ The method steps as recited in claim 1 that provide a double coating of the composition-modified barium titanate powder and ~~[[the]]~~ a hot-isostatic-pressing process which together assisted in allowing ~~[[allowed]]~~ an applied voltage of 3500 V to a dielectric thickness of 12.7~~[[microns]]~~  $2 \times 10^{-4}$  cm to be achieved.

Please add New claims 18, 19, and 20:

18. (New) The method steps as recited in claim 1 that provide an EESU which was fully discharged and recharged and the EESU's initial specifications was not degraded.
19. (New) The method steps as recited in claim 1 that provide a EESU which was safely charged to 3500 V and stored at least 52.22 kW•h of electrical energy.
20. (New) The method steps as recited in claim 1 which provide an EESU that has a total capacitance of at least 31 F.

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21. (New) The method steps as recited in claim 1 which provide an EESU that was rapidly charged without damaging the material or reducing its life.

Conclusion

In light of the above remarks, additions, and amendments, it is respectfully submitted that the application is in condition for allowance and action to that end is respectfully urged. If the Examiner believes that a telephone conference would in any way aid the prosecution of this case, please call the undersigned at (512) 258-5669.

Dated:

Respectfully submitted

By

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